REMARKS

Status Of Application

Claims 1-16 were pending in the application. By this amendment, new claims 17-20 have been added. The status of claims 1-16 is as follows:

Claims 1-7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Huang et al., U.S. Patent No. 5,748,277 (hereinafter the "Huang patent"), taken with Wu et al., U.S. Patent No. 5,933,203 (hereinafter the "Wu patent");

Claims 8 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Huang patent, taken with the Wu patent;

Claims 10-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Huang patent; and

Claims 15 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Huang patent as applied to claim 14, and further in view of Tsuboyama et al., U.S. Patent No. 5,963,190 (hereinafter the "Tsuboyama patent").

Claim Amendments

Amendments were made to claims 2-7, 9, and 11-15 only to correct grammatical errors, and claim 8 was amended to improve the form thereof. These amendments do not narrow the claims, and are not related to the patentability of the invention over the prior art.

Drawings

The indication, in the Notice of Draftsperson's Patent Drawing Review, that the Official Draftsperson has no objections to the drawings, is noted with appreciation.

A Request for Approval of Proposed Drawing Changes in accordance with 37 C.F.R. § 1.121(a)(3)(ii) is submitted herewith, for consideration by the Examiner, to amend Fig. 24 to correct a typographical error.

35 U.S.C. § 103(a) Rejections

Claims 1-7

The rejection of claims 1-7 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, taken with the Wu patent, is respectfully traversed based on the following.

Claim 1 requires a liquid crystal display having liquid crystal material, a driver for driving the liquid crystal display, and a controller for controlling the driver to drive at least a part of the liquid crystal display by selectively using one of a first drive method and a second drive method which are different from each other in operational principle of the liquid crystal material.

Neither the Huang patent nor the Wu patent discloses or suggests a controller for controlling a driver to drive at least part of a liquid crystal display by selectively using one of a first drive method and a second drive method which are different from each other in operational principle of the liquid crystal material.

While the Office Action does state that the Huang patent does not disclose a controller as required by claim 1 of the present invention, the Office Action states that the Huang patent suggests a controller as required by claim 1. However, the Huang patent describes one method including a series of processes which are performed in sequence to execute a display operation, and thus, fails to disclose or suggest a controller for controlling a driver to drive at least a part of the liquid crystal display by selectively using one of a first drive method and a second drive method which are different from each other in operational principle of the liquid crystal material.

The Office Action further states that column 3, lines 45-50, of the Wu patent teaches a controller as required by claim 1. Column 3, lines 45-50, of the Wu patent states that "initially driving comprises the step of applying a sequence of pulses to drive the portion to the nematic phase, and the step of subsequently driving comprises the step of

applying a sequence of pulses to drive the portion to the cholesteric phase focal-conic state." That is, according to the Wu patent, it is necessary to first drive the liquid crystal to a nematic phase, then drive the liquid crystal material to a cholesteric phase focal-conic state, in order to perform a display operation. Therefore, the Wu patent does not disclose or suggest a controller for controlling a driver to drive a portion of a liquid crystal display by selectively using one of a first drive method and a second drive method which are different from each other in operational principle of the liquid crystal material because, according to the Wu patent, the same operation of driving to the nematic phase and driving to the cholesteric phase focal-conic state is always performed on the liquid crystal. Therefore, the combination of the Huang patent and the Wu patent does not disclose or suggest all of the requirements of claim 1, and thus does not render claim 1 obvious.

Each of claims 2-7 depends either directly or indirectly from claim 1. Therefore, claims 2-7 are not rendered obvious by any combination of the Huang patent and the Wu patent.

Accordingly, it is respectfully requested that the rejection of claims 1-7 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, taken with the Wu patent, be reconsidered and withdrawn.

Claims 8 and 9

The rejection of claims 8 and 9 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, taken with the Wu patent, is respectfully traversed based on the following.

Claim 8 requires, *inter alia*,

> a controller for controlling said driver to drive at least a part of said liquid crystal display by selectively using one of a first drive method and a second drive method,
> wherein:
> low contrast formation of an image on said liquid crystal display is possible by using said first drive method; and

high contrast formation of an image on said liquid crystal display is possible by using said second drive method.

As stated in the foregoing regarding claim 1, neither the Huang patent nor the Wu patent disclose or suggest a controller for controlling a driver to drive at least a part of a liquid crystal display by selectively using one of a first drive method and a second drive method.

Furthermore, neither the Huang patent nor the Wu patent discloses or suggests a device wherein low contrast formation of an image on the liquid crystal display is possible by using the first drive method and wherein high contrast formation of an image on the liquid crystal display is possible by using the second drive method. In particular, column 10, lines 20-31, of the Huang patent, which was cited in the Office Action, discloses that "crosstalking" can occur among pixels, not that low contrast formation of an image is possible by using a first drive method and that high contrast formation of image data is possible by using said second drive method. Thus, in another way, claim 8 is distinguished over the combination of the Huang patent and the Wu patent.

Claim 9 depends from claim 8. Therefore, claim 9 is not rendered obvious by any combination of the Wu patent and the Huang patent.

Accordingly, it is respectfully requested that the rejection of claims 8 and 9 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, taken with the Wu patent, be reconsidered and withdrawn.

Claims 10-14

The rejection of claims 10-14 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, is respectfully traversed based on the following.

Claim 10 requires a controller for controlling a driver to drive the liquid crystal display a plurality of times to form at least one image in at least one portion of the liquid crystal display by repeatedly scanning the at least one portion. The Huang patent does not

disclose or suggest this feature. Therefore, claim 10 could not be rendered obvious by the Huang patent.

Claims 11-14 depend either directly or ultimately from claim 10. Therefore, claims 11-14 could not be rendered obvious by the Huang patent.

Accordingly, it is respectfully requested that the rejection of claims 10-14 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, be reconsidered and withdrawn.

Claims 15 and 16

The rejection of claims 15 and 16 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, and further in view of the Tsuboyama patent, is respectfully traversed based on the following.

Claim 15 depends from claim 10. As the above argument for claim 10 over the Huang patent showed, claim 10 is distinguished over the Huang patent. In particular, the Huang patent does not disclose or suggest a controller for controlling a driver to drive a liquid crystal display a plurality of times to form at least one image in at least one portion of said liquid crystal display by repeatedly scanning the image wherein a contrast amount of the image is increased after each scan.

As is the case with the Huang patent, the Tsuboyama patent also does not disclose or suggest a controller for controlling a driver to drive a liquid crystal display a plurality of times to form at least one image in at least one portion of said liquid crystal display by repeatedly scanning the image wherein a contrast amount of the image is increased after each scan. Therefore, claim 10 and dependent claim 15 are not rendered obvious by any combination of the Huang patent and the Tsuboyama patent.

Furthermore, each of claim 15 and claim 16 require the steps of (a) addressing a plurality of scan electrodes and a plurality of data electrodes to reset an area of the liquid

crystal display, (b) addressing a plurality of scan electrodes sequentially, (c) addressing selected ones of the data electrodes synchronizing with the sequential addressing of the scan electrodes in step (b), and repeating steps (b) and (c) a plurality of times without interposing step (a).

The Office Action correctly admits that the Huang patent does not disclose the requirements of claims 15 and 16. However, the Office Action further states that the Tsuboyama patent teaches the steps required in claims 15 and 16, citing column 6, lines 15-22, of the Tsuboyama patent. Column 6, lines 15-22, of the Tsuboyama patent discloses that in order to prevent the optical modulation substance from being mono-stabilized into one optical state it is appropriate to effect a refresh scanning. The Tsuboyama patent further states that each time such a refresh scanning is performed, the pixels are reset, then rewritten into the original display states, thus renewing the image. Therefore, the Tsuboyama patent does not disclose or suggest the step of repeating addressing of a plurality of scanning electrodes sequentially and the addressing of selected data electrodes synchronizing with the sequential addressing of the scan electrodes without interposing the resetting step.

Thus, neither the Huang patent nor the Tsuboyama patent disclose or suggest all of the steps required by each of claims 15 and claim 16. Therefore, claims 15 and 16 could not be rendered obvious by any combination of the Huang patent and the Tsuboyama patent.

Accordingly, it is respectfully requested that the rejection of claims 15 and 16 under 35 U.S.C. § 103(a), as being unpatentable over the Huang patent, and further in view of the Tsuboyama patent, be reconsidered and withdrawn.

Claims 17-20

This amendment adds new claim 17 which recites a method comprising the steps of (a) addressing a plurality of scan electrodes sequentially, (b) addressing data electrodes synchronizing with the sequential addressing of the scan electrodes of step (a), (c)

repeating steps (a) and (b) a plurality of times, and (d) displaying an image on the liquid crystal display without applying electrical voltage to any one of the scanning electrodes and data electrodes. None of the cited references, whether taken singly or in combination, disclose or suggest a method that includes all of the steps of claim 17. Therefore, claim 17 is distinguished and nonobvious over the cited references.

Each of claims 18-20 depend from claim 1. Claim 1 is distinguished over the cited references. Therefore, claims 18-20 are distinguished over the cited references.

CONCLUSION

Wherefore, in view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment increases the number of independent claims from four to a total of five independent claims and increases the total number of claims from sixteen to a total of seventeen claims, but does not present any multiple dependency claims. Accordingly, a Response Transmittal and Fee Authorization form authorizing the amount of $84.00 to be charged to Sidley Austin Brown & Wood's Deposit Account No. 18-1260 is enclosed herewith in duplicate. However, if the Response Transmittal and Fee Authorization form is missing, insufficient, or otherwise inadequate, or if a fee, other than the issue fee, is required during the pendency of this application, please charge such fee to Sidley Austin Brown & Wood's Deposit Account No. 18-1260. Please credit any overpayment to Sidley Austin Brown & Wood's Deposit Account No. 18-1260.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

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Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood's Deposit Account No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

The following is a marked-up version of the changes to the claims which are being made in the attached response to the Office Action dated September 7, 2001.

IN THE SPECIFICATION:

Paragraph beginning at page 4, line 16, and ending at page 4, line 21:

> Especially by adopting a structure wherein liquid crystal which exhibits a cholesteric phase in a room temperature is filled between transparent plastic films, a liquid crystal display which is thin, light and strong against an external [forth] force (bend or shock) can be obtained, and this display is suited to be used as portable information equipment such as an electronic book, which is the aim of the present invention.

Paragraph beginning at page 6, line 14, and ending at page 9, line 2:

> These and other objects and features of the present invention will be apparent from the following description with reference to the accompanying drawings, in which:
>
> Fig. 1 is a sectional view of an exemplary liquid crystal display according to the present invention;
>
> Fig. 2 is a plan view which shows a film substrate of the liquid crystal display with a columnar structure and a sealant formed thereon;
>
> Fig. 3 is an illustration which shows a manufacturing process of the liquid crystal display;
>
> Fig. 4 is a block diagram which shows a matrix driving circuit for the liquid crystal display;
>
> Fig. 5 is a chart which shows the waveforms of voltages applied in the

matrix driving circuit;

Fig. 6 is a graph which shows the relationship between the applied voltage in the matrix driving circuit and the Y value;

Fig. 7 is a chart which shows the waveforms of voltages which were experimentally applied to a test cell;

Fig. 8 is a chart which shows the waveforms of voltages applied for operation in a rapid mode;

Fig. 9 is a chart which shows a first exemplary waveform of a voltage applied for operation in an ordinary mode;

Fig. 10 is a chart which shows a second exemplary waveform of a voltage applied for operation in the ordinary mode;

Fig. 11 is a chart which shows a third exemplary waveform of a voltage applied for operation in the ordinary mode;

Fig. 12 is a block diagram which shows a driving/image signal processing circuit used in an embodiment of the present invention;

Fig. 13 is a flowchart which shows a control procedure for operation in the ordinary mode;

Figs. 14a through 14d show images written by a first writing process, by a second writing process, by a third writing process and by a fourth writing process, respectively, in the control procedure shown by Fig. 13;

Fig. 15 is a flowchart which shows another control procedure of the liquid crystal display;

Fig. 16 is a block diagram which shows another exemplary driving circuit for the liquid crystal display;

Fig. 17 is a plan view of an exemplary electronic book type information display device, showing an exemplary display in the rapid mode;

Fig. 18 is a perspective view of [a book open.] an open book;

Fig. 19 is a plan view of the electronic book type information display device, showing another exemplary display in the rapid mode;

Fig. 20 is a plan view of the electronic book type information display device, showing another exemplary display in the rapid mode;

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Fig. 21 is a plan view of the electronic book type information display device, showing another exemplary display in the rapid mode;

Fig. 22 is a schematic side view of an example of the information display device provided with a front light;

Fig. 23 is an illustration of an exemplary display pattern on the liquid crystal display;

Fig. 24 is a flowchart which shows a control procedure for operation in the rapid mode;

Fig. 25 is a flowchart which shows another control procedure for operation in the rapid mode;

Fig. 26 is a block diagram of a first exemplary information display system;

Fig. 27 is a block diagram which shows a control circuit built in an information display device in the system shown by Fig. 26;

Fig. 28 is a block diagram of a second exemplary information display system;

Fig. 29 is a plan view of an information display device provided with a speaker;

Fig. 30 is an illustration which shows a first exemplary recording media vending system; and

Fig. 31 is an illustration which shows a second exemplary recording media vending system.

Paragraph beginning at page 25, line 2, and ending at page 25, line 17:

In the liquid crystal display 10, the display [sate] state of the liquid crystal is a function of the voltage applied and the pulse width. By resetting the whole liquid crystal to the focal-conic state wherein the liquid crystal shows the lowest Y value (luminous reflectance) and thereafter, applying a pulse voltage with a constant pulse width to the liquid crystal, the display state of the liquid crystal changes as Fig. 6 shows. In the graph of Fig. 6, the y-axis indicates the Y value, and the x-axis indicates the voltage applied. When a pulse voltage Vp is applied,

the liquid crystal comes to the planar state wherein the liquid crystal shows the highest Y value, and when a pulse voltage Vf is applied, the liquid crystal comes to the focal-conic state wherein the liquid crystal shows the lowest Y value. Also, when an intermediate pulse voltage between Vp and Vf is applied, the liquid crystal comes to an intermediate state between the planar state and the focal-conic state wherein the liquid crystal shows an intermediate Y value, and thus, a display of an intermediate color is possible.

Paragraph beginning at page 27, line 20, and ending at page 28, line 3:

Fig. 7 shows waveforms (a) and (b) of pulse voltages applied to a test cell produced by the inventors as a trial. In the experiment, only one pixel was subjected. The voltage of the reset signal was 50V. The pulse width of the reset signal (the reset duration) was [200msc] 200 msec in the case of (a) and [50msec] 50 msec in the case of (b). As the selective signal to set the pixel to the planar state, 90V-Vc (110V) was applied for [5msec] 5 msec. Although the voltage of the selective signal was set to 110V in the experiment, the signal may be of any other voltage. The voltage shall be determined depending on the material and the thickness of the liquid crystal and the pulse width of the signal.

Paragraph beginning at page 31, line 19, and ending at page 31, line 26:

Fig. 13 shows a control procedure for a fade-in display of a multi-tone color image adopting the second exemplary drive in the ordinary mode shown in Fig. 10. In this control procedure, a pulse voltage is applied four times. The contrast becomes higher [every] after every application of the voltage, and after the fourth application, a complete color image is displayed. If a command for a display of another image is inputted in the middle of four applications of the pulse voltage, the display will change to the new image, and this is seen as operation in the rapid mode.

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Paragraph beginning at page 34, line 11, and ending at page 34, line 19:

The controller 24 has an internal timer, and a predetermined time is set in the timer. When the time has passed, the scan signal controller 23 and the data signal controller 24, while referring to the addresses stored in the address storage 42, send control signals to the scan signal driving IC 21 and the data signal driving [IC22] IC 22 for rewriting of only the parts. Thereby, the scan signal driving IC 21 and the data signal driving IC 22 drive only the parts of the liquid crystal to be rewritten. In this driving method, rewriting of only the parts to be rewritten is possible, and this is more speedy than rewriting of the entire display.

Paragraph beginning at page 36, line 23, and ending at page 37, line 7:

The quantity of reflected light of the liquid crystal display 10 is lowered at night and in a dark room. As Fig. 22 shows, in order to compensate a loss in the quantity of reflected light, a front light 47 and a diffusing plate 48 are provided on the front side of the liquid crystal display 10. The turn-on/turn-off of the front light 47 and regulation of the quantity of light are controlled based on the detection result of a light receiving sensor 49 shown in Fig. 17. When the [The] detection result is lower than a specified value, the quantity of light emitted from the front light 47 is increased, and when the detection result is above the specified value, the quantity of light emitted from the front light 47 is fixed to a low value, or the front light 47 is turned off.

IN THE CLAIMS:

2. (Once Amended) [The] A display device according to claim 1, wherein the said liquid crystal display is capable of keeping an image having been formed thereon without consuming electric power.

3. (Once Amended) [The] A display device according to claim 2, wherein said liquid crystal material comprises a cholesteric liquid crystal material.

4. (Once Amended) [The] A display device according to claim 3, wherein said cholesteric liquid crystal material comprises a chiral nematic liquid crystal material.

5. (Once Amended) [The] A display device according to claim 1, wherein a first time period required to renew an image on said liquid crystal display by using said first drive method is longer than a second time period required to renew an image on said liquid crystal display by using said second drive method.

6. (Once Amended) [The] A display device according to claim 1, wherein a first electric power consumption required to keep an image on said liquid crystal display by using said first drive method is greater than a second electric power consumption required to keep an image on said liquid crystal display by using said second drive method.

7. (Once Amended) [The] A display device according to claim 6, wherein the image formed on said liquid crystal display by using said second drive method is capable of remaining without consumption of electric power.

8. (Once Amended) A display device comprising:

a liquid crystal display having a liquid crystal material;

a driver for driving said liquid crystal display; and

a controller for controlling said driver to drive at least a part of said liquid crystal display by selectively using one of a first drive method and a second drive method,

wherein:

[incomplete] low contrast formation of an image on said liquid crystal display is possible by using said first drive method; and

[complete] high contrast formation of an image on said liquid crystal display is possible by using said second drive method.

9. (Once Amended) [The] A display device according to claim 8, wherein a first contrast of an image displayed on said liquid crystal display by using said first drive

method is lower than a second contrast of an image displayed on said liquid crystal display by using said second drive method.

10. (Once Amended) A display device comprising:

a liquid crystal display which is capable of keeping an image having been formed thereon without consuming electric power;

a driver for driving said liquid crystal display; and

a controller for controlling said driver to drive said liquid crystal display a plurality of times to form at least one image in at least one portion of said liquid crystal display by repeatedly scanning said at least one portion.

11. (Once Amended) [The] A display device according to claim 10, wherein said controller is capable of changing the number of driving times for forming at least one image.

12. (Once Amended) [The] A display device according to claim 10, wherein said liquid crystal display comprises a cholesteric liquid crystal material.

13. (Once Amended) [The] A display device according to claim 12, wherein said cholesteric liquid crystal material comprises a chiral nematic liquid crystal material.

14. (Once Amended) [The] A display device according to claim 10, wherein said liquid crystal display comprises a plurality of scan electrodes and a plurality of data electrodes.

15. (Once Amended) [The] A display device according to claim 14, wherein said controller is capable of controlling said driver so as to execute the steps of:

(a) addressing a plurality of said scan electrodes and a plurality of said data electrodes to reset an area of said liquid crystal display defined by the plurality of scan electrodes and the plurality of data electrodes;

(b) addressing a plurality of scan electrodes sequentially;

(c) addressing selected ones of said data electrodes synchronizing with the sequential addressing of the scan electrodes in the step (b); and

(d) repeating the steps (b) and (c) a plurality of times without interposing the step (a).

Claims 17-20 have been added.